

## CLAIMS

What is claimed is:

1. In a pecan processing facility having a cracker producing a primary cracker product feeding a width separation device, and the cracker also producing a secondary cracker product, a method of operating the pecan processing plant comprising:

separating the secondary cracker product by weight into a lighter portion, and a heavier portion; and

applying the heavier portion to the width separation device.

2. The method of operating a pecan processing plant as defined in claim 1 further comprising: transporting the secondary cracker product to a separation device by:

moving air through a conduit; and

carrying the secondary cracker product in the air moving through the conduit to the separation device.

3. The method of operating a pecan processing plant as defined in claim 2 wherein moving air through the conduit further comprises creating a vacuum within the conduit.

4. The method of operating a pecan processing plant as defined in claim 3 wherein moving air through a conduit further comprises moving air through a conduit having a substantially circular cross-section.

5. The method of operating a pecan processing plant as defined in claim 2 wherein separating the secondary cracker product by weight into a lighter portion and a heavier portion further comprises:

forcing the secondary cracker product and air downward;  
counter-flowing air upward through the secondary cracker product;  
carrying the lighter portion with the counter-flowing air; and  
allowing the heavier portion to fall to an air lock.

6. The method of operating a pecan processing plant as defined in claim 1 further comprising disposing of the lighter portion of the secondary cracker product.

7. A structure of a pecan processing machine comprising:  
a cracker producing a primary cracker product and a secondary cracker product;  
a separation device in operational relationship to the cracker and receiving the secondary cracker product, wherein the separation device separates the secondary cracker product into a first portion and a second portion; and

a width separation device in operational relationship to the cracker and the weight separation device, and wherein the width separation device receiving the primary cracker product from the cracker and the first portion of the secondary cracker product from the separation device.

8. The structure of a pecan processing machine as defined in claim 7 wherein the separation device further comprises a weight separation device that separates the secondary cracker product into the first portion being a heavier portion and the second portion being a lighter portion.

9. The structure of a pecan processing machine as defined in claim 8 wherein the weight separation device further comprises and aspirator.

10. The structure of a pecan processing machine as defined in claim 8 wherein the weight separation device further comprises an air separator.

11. The structure of a pecan processing machine as defined in claim 7 wherein the width separation device further comprises a series of substantially coplanar screens.

12. The structure of a pecan processing machine as defined in claim 7 wherein the width separation device further comprises a series of substantially stacked screens.

13. The structure of a pecan processing machine as defined in claim 8 wherein the weight separation device further comprises:

an inlet conduit;

a lighter product outlet conduit;

a separation chamber fluidly coupling the inlet conduit and outlet conduit, wherein the lighter portion of the secondary cracker product is separated from the heavier portion of the secondary cracker product in the separation chamber, and wherein the lighter portion of the secondary cracker product exits the separation device through the lighter product outlet conduit;

an air lock fluidly coupled to a bottom portion of the separation chamber, and wherein the air lock provides fluid isolation between the separation chamber and a heavier production outlet conduit; and

wherein the heavier portion of the secondary cracker product exists through the heavier product outlet conduit.

14. The structure of a pecan processing machine as defined in claim 13 wherein the inlet conduit and outlet conduit have substantially a rectangular cross-section.

15. The structure of a pecan processing machine as defined in claim 13 wherein the separation chamber of the width separation device further comprises a baffle at least partially blocking a flow of air from the inlet conduit to the lighter product outlet conduit

16. The structure of a pecan processing machine as defined in claim 7 further comprising a conveying system that transfers the secondary cracker product from the cracker to the separation device.

17. The structure of a pecan processing machine as defined in claim 16 wherein the conveying system that transfers the secondary cracker product from the cracker to the separation device further comprises a transfer conduit, and wherein air moving within the transfer conduit carries the secondary cracker product.

18. The structure of a pecan processing machine as defined in claim 17 wherein the transfer conduit further comprises a pipe having a substantially circular cross-section.

19. The structure of a pecan processing machine as defined in claim 17 wherein the internal diameter of the transfer conduit is under at least a partial vacuum.

20. A method of operating a pecan shelling plant comprising:  
cracking pecans to produce a cracker product stream;  
sizing the cracker product stream into a plurality of width graduations;  
sorting uncracked pecans from a largest width graduation; and  
returning substantially only the uncracked pecans to the cracker.

21. The method of operating a pecan shelling plant as defined in claim 20 further comprising, before the sorting step, shelling the largest width graduation to further break shells of cracked pecans, and pass unaffected uncracked pecans.

22. The method of operating a pecan shelling plant as defined in claim 21 wherein shelling the largest width graduation further comprises passing the largest width graduation through a pair of substantially parallel rotating rubber coated cylinders adjusted to further shell cracked pecans and pass unaffected uncracked pecans.

23. The method of operating a pecan shelling plant as defined in claim 20 wherein sorting the uncracked pecans from the largest width graduation further comprises:

sorting the largest width graduation by thickness into a thicker range comprising uncracked pecans and substantially whole cracked pecans; and

separating the uncracked pecans from the thicker range.

24. The method of operating a pecan shelling plant as defined in claim 23 wherein separating the uncracked pecans from the thicker range further comprises applying the thicker range to a pin sorter which separates the uncracked pecans from the substantially whole cracked pecans.

25. The method of operating a pecan shelling plant as defined in claim 23 further comprising returning the substantially whole cracked pecans to the sizing step.

26. A structure of a pecan processing machine comprising:  
a cracker cracking pecans to produce a cracker product stream;  
a width sizing device receiving the cracker product stream and dividing the cracker product stream into a plurality of width graduations;  
a sorting device receiving at least a portion of a largest width graduation, and wherein the sorting device sorts substantially only uncracked pecans from the largest width graduation; and  
wherein the substantially only uncracked pecans sorted from the largest width graduation are returned to the cracker.

27. The structure of a pecan processing machine as defined in claim 26 wherein the width sizing device further comprises a series of substantially coplanar screens.

28. The structure of a pecan processing machine as defined in claim 26 wherein the width sizing device further comprises a series of stacked screens.

29. The structure of a pecan processing machine as defined in claim 26 wherein the sorting device further comprise a pin sorter.

30. The structure of a pecan processing machine as defined in claim 26 further comprising:

a shelling device feedingly coupled to the width sizing device and receiving the largest width graduation, wherein the shelling device shells a portion of the largest width graduation; and

a thickness sizing device feedingly coupled to the shelling device, and wherein the thickness sizing device divides the largest width graduation into a larger thickness range comprising uncracked nuts and substantially whole cracked nuts, and a smaller thickness range.

31. The structure of a pecan processing machine as defined in claim 30 wherein the shelling device further comprises a pair of substantially parallel rubber coated cylinders rotating substantially along the pull of gravity as measured between them.

32. The structure of a pecan processing machine as defined in claim 30 wherein the thickness sizing device further comprises a vibrating screen having a plurality of elongated holes therein, and wherein the larger thickness range passes over the vibrating screen, and the smaller thickness range falls through the vibrating screen.

33. The structure of a pecan processing machine as defined in claim 30 wherein the smaller thickness range is conveyed to the thickness sizing device.

34. A method of operating a pecan processing plant comprising:  
cracking pecans to produce a primary cracker product and a secondary cracker product;  
separating the secondary cracker product by weight into a lighter portion comprising shells and dust, and a heavier portion comprising pecan meat;  
sizing the heavier portion of the secondary cracker product and the primary cracker product into a plurality of width graduations;  
sorting uncracked pecans from a largest width graduation; and  
returning substantially only the uncracked pecans to the cracker.

35. The method of operating a pecan processing plant as defined in claim 34 further comprising:

transporting the secondary cracker product to a weight separation device by:  
moving air through a conduit; and  
carrying the secondary cracker product in the air moving through the conduit to the weight separation device.

36. The method of operating a pecan processing plant as defined in claim 35 wherein moving air through the conduit further comprises creating a vacuum within the conduit.



37. The method of operating a pecan processing plant as defined in claim 36 wherein moving air through the conduit further comprises moving air through the conduit having a substantially circular cross-section.

38. The method of operating a pecan shelling plant as defined in claim 34 further comprising, before the sorting step, shelling the largest width graduation further cracking cracked pecans and passing unaffected uncracked pecans.

39. The method of operating a pecan shelling plant as defined in claim 38 wherein shelling the largest width category further comprises passing the largest width graduation through a pair of substantially parallel rubber coated cylinders rotating substantially along the pull of gravity as measured between them, and wherein the spacing between the pair of rubber coated cylinders is such that uncracked pecans pass through unaffected.

40. The method of operating a pecan shelling plant as defined in claim 34 wherein sorting the uncracked pecans from the largest width graduation further comprises:

    sorting the largest width graduation by thickness into a thicker range comprising uncracked pecans and substantially whole cracked pecans; and

    sorting the thicker range into uncracked pecans and substantially whole cracked pecans.

41. The method of operating a pecan shelling plant as defined in claim 40 wherein sorting the thicker range further comprises applying the thicker range to a pin sorter which separates the uncracked pecans from the substantially whole cracked pecans.

42. The method of operating a pecan shelling plant as defined in claim 40 further comprising returning the substantially whole cracked pecans to the sizing step.

43. A structure of a pecan processing machine comprising:

a cracker producing a primary cracker product stream and a secondary cracker product stream;

a separation device feedingly coupled to the secondary cracker product stream of the cracker, wherein the separation device separates the secondary cracker product by weight into a lighter portion and a heavier portion;

a width sizing device receiving the primary cracker product stream and the heavier portion of the secondary cracker product stream, the width sizing device dividing the primary cracker product stream and the heavier portion of the secondary cracker product into a plurality of width graduations;

a sorting device receiving at least a portion of a largest width graduation, and wherein the sorting device sorts substantially only uncracked pecans from the largest width graduation; and

wherein the substantially only uncracked pecans sorted from the largest width graduation are returned to the cracker.

44. The structure of a pecan processing machine as defined in claim 43 wherein the weight separation device further comprises:

an inlet conduit;

a lighter product outlet conduit;

a separation chamber fluidly coupling the inlet conduit and the lighter product outlet conduit, wherein the lighter portion of the secondary cracker product stream is separated from the heavier portion of the secondary cracker product by air flow, and wherein the lighter portion of the secondary cracker product stream exits the separation device through the lighter product outlet conduit;

an air lock fluidly coupled to a bottom portion of the separation chamber, and wherein the air lock provides fluid isolation between the separation chamber and a heavier production outlet conduit; and

wherein the heavier portion of the secondary cracker product stream exists through the heavier product outlet conduit.

45. The structure of a pecan processing machine as defined in claim 44 wherein the inlet conduit and outlet conduit have substantially a rectangular cross-section.

46. The structure of a pecan processing machine as defined in claim 44 wherein the separation chamber of the width separation device further comprises a baffle at least partially blocking a flow of air from the inlet conduit to the lighter product outlet conduit.

47. The structure of a pecan processing machine as defined in claim 43 further comprising a transfer conduit adapted to transfer the secondary cracker product stream from the cracker to the separation device, and wherein air moving within the transfer conduit carries the secondary cracker product stream.

48. The structure of a pecan processing machine as defined in claim 47 wherein the transfer conduit further comprises a pipe having a substantially circular cross-section.

49. The structure of a pecan processing machine as defined in claim 47 wherein the internal diameter of the transfer conduit is under at least a partial vacuum.

50. The structure of a pecan processing machine as defined in claim 43 wherein the width sizing device further comprises a series of substantially coplanar screens.

51. The structure of a pecan processing machine as defined in claim 43 wherein the width sizing device further comprises a series of stacked screens.

52. The structure of a pecan processing machine as defined in claim 43 wherein the sorting device further comprise a pin sorter.

53. The structure of a pecan processing machine as defined in claim 43 further comprising:  
a shelling device feedingly coupled to the width sizing device and receiving the largest width graduation, wherein the shelling device adapted to shell a portion of the largest width graduation; and

a thickness sizing device feedingly coupled to the shelling device, and wherein the thickness sizing device divides the largest width stream into a larger thickness range comprising uncracked nuts and substantially whole cracked nuts, and a smaller thickness range.

54. The structure of a pecan processing machine as defined in claim 53 wherein the shelling device further comprises a pair of substantially parallel rubber coated cylinders rotating substantially along the pull of gravity as measured between the pair of rubber coated cylinders.

55. The structure of a pecan processing machine as defined in claim 53 wherein the thickness sizing device further comprises a vibrating screen having a plurality of elongated holes therein, and wherein the larger thickness range passes over the vibrating screen, and the smaller thickness range falls through the vibrating screen.

56. The structure of a pecan processing machine as defined in claim 53 wherein the smaller thickness range is conveyed to the width sizing device.

57. A thickness separation device for separating nut parts, the thickness separation device comprising:

a first steel roller having a circular cross section;

a second steel roller having a circular cross section, the second steel roller substantially parallel to the first steel roller;

a first slot defined by a larger diameter portion of each of the first and second steel rollers;

a second slot defined by a smaller diameter portion of each of the first and second steel rollers; and

and wherein thicker nut parts slide over the first slot and fall through the second slot, and wherein thinner nut parts fall through the first slot.

58. The thickness separating device for nut parts as defined in claim 57 further comprising said first and second steel rollers sloped from their larger diameter portions, having a higher elevation, to their lower diameter portions.

59. The thickness separating device for nut parts as defined in claim 58 further comprising said first and second steel rollers rotating substantially opposite the pull of gravity as measured between them.

60. The thickness separating device for nut parts as defined in claim 59 further comprising a circumferential notch in the larger diameter portion of each of the first and second steel roller.

61. The thickness separating device for nut parts as defined in claim 60 further comprising:  
said first slot having a smaller dimension slightly less than a thickness of a sticktight nut part; and  
said second slot having a smaller dimension greater than the thickness of a sticktight nut part.

62. In a nut processing facility having a cracker producing a primary cracker product feeding a width separation device, and the cracker also producing a secondary cracker product, a method of operating the nut processing plant comprising:

separating the secondary cracker product by weight into a lighter portion, and a heavier portion; and

applying the heavier portion to the width separation device.

63. The method of operating a nut processing plant as defined in claim 62 further comprising:  
transporting the secondary cracker product to a separation device by:  
moving air through a conduit; and  
carrying the secondary cracker product in the air moving through the conduit to the  
separation device.

64. The method of operating a nut processing plant as defined in claim 63 wherein moving air  
through the conduit further comprises creating a vacuum within the conduit.

65. The method of operating a nut processing plant as defined in claim 64 wherein moving air  
through a conduit further comprises moving air through a conduit having a substantially circular  
cross-section.

66. The method of operating a nut processing plant as defined in claim 64 wherein separating  
the secondary cracker product by weight into a lighter portion and a heavier portion further  
comprises:

forcing the secondary cracker product and air downward;  
counter-flowing air upward through the secondary cracker product;  
carrying the lighter portion with the counter-flowing air; and  
allowing the heavier portion to fall to an air lock.

67. The method of operating a nut processing plant as defined in claim 66 further comprising disposing of the lighter portion of the secondary cracker product.

68. A method of operating a nut shelling plant comprising:  
cracking nuts to produce a cracker product stream;  
sizing the cracker product stream into a plurality of width graduations;  
sorting uncracked nuts from a largest width graduation; and  
returning substantially only the uncracked nuts to the cracker.

69. The method of operating a nut shelling plant as defined in claim 68 further comprising, before the sorting step, shelling the largest width graduation to further break shells of cracked nuts, and pass unaffected uncracked nuts.

70. The method of operating a nut shelling plant as defined in claim 69 wherein shelling the largest width graduation further comprises passing the largest width graduation through a pair of substantially parallel rotating rubber coated cylinders adjusted to further shell cracked nuts and pass unaffected uncracked nuts.

71. The method of operating a nut shelling plant as defined in claim 68 wherein sorting the uncracked nuts from the largest width graduation further comprises:

sorting the largest width graduation by thickness into a thicker range comprising uncracked nuts and substantially whole cracked nuts; and  
separating the uncracked nuts from the thicker range.



72. The method of operating a nut shelling plant as defined in claim 71 wherein separation the uncracked nuts from the thicker range further comprises applying the thicker range to a pin sorter which separates the uncracked nuts from the substantially whole cracked nuts.

73. The method of operating a nut shelling plant as defined in claim 71 further comprising returning the substantially whole cracked nuts to the sizing step.

For reference